Some Thoughts on the Information Technology Revolution in Standard Oil

Robert B. Horton
Chairman and CEO
The Standard Oil Company
(British Petroleum)

90s: 86-029

Management in the 1990s

Some Thoughts
on the
Information Technology
Revolution in Standard Oil

Robert B. Horton
Chairman and CEO
The Standard Oil Company
(British Petroleum)

90s: 86-029

October, 1986

CISR WP#
Sloan WP#

Management in the 1990s
Sloan School of Management
Massachusetts Institute of Technology

Management in the 1990s is an industry and governmental agency supported research program. Its aim is to develop a better understanding of the managerial issues of the 1990s and how to deal most effectively with them, particularly as these issues revolve around anticipated advances in Information Technology.

Assisting the work of the Sloan School scholars with financial support and as working partners in research are:

American Express Travel Related Services Company
Arthur Young and Company
British Petroleum Company, p.l.c.
BellSouth Corporation
Digital Equipment Corporation
Eastman Kodak Company
General Motors Corporation
International Computers, Ltd.
MCI Communications Corporation
United States Internal Revenue Service

The conclusions or opinions expressed in this paper are those of the author(s) and do not necessarily reflect the opinion of Massachussetts Institute of Technology, Management in the 1990s Research Program, or its sponsoring organizations.

SOME THOUGHTS ON THE INFORMATION TECHNOLOGY REVOLUTION

IN STANDARD OIL

Robert B. Horton
Chairman & CEO
The Standard Oil Company

MIT - Sloan Convocation
Boston, Oct. 17, 1986

October 17th is the 209th anniversary of a momentous event in American history. On October 17th, 1777, Gentleman Johnny Burgoyne surrendered himself and his army to you colonists at Saratoga. For my part of our discussion this morning, I'd like to surrender my general observations as much as possible and zero in on some specifics relating to the oil business, and particularly to Standard Oil and British Petroleum.

I'll break my presentation down into two parts. First, our tactical applications of information technology; and second, the strategic implications for the '90s. And since I'm back at Sloan, I'll use the matrix approach, and cover those two arenas from three points of view. First, what we have done so far in adopting information technology; second, what I expect us do as time goes on, because of what we've done already; and finally, some implications that I see for my company because of what we've done and will do.

I. The Tactical Arena

On the tactical level, we've made enormous strides over the past years in implementing the early phase of the automated office. British Petroleum has a richer executive information system than Standard Oil right now. Our computers are faster and stronger, but their system is ahead of ours. When it comes to control systems, I think we're possibly a little ahead of the game. But our task is simpler. However, we have a long way to go to make our systems equal to our needs. So let me tell you a bit about our use of information technology out in the field. And here I may have some useful things to share with you.

It's fashionable to talk about the automated factory, and the way I.T. is bringing this closer. We have some automated operations, product terminals and the like, and the ability to match automated invoicing and credit information with instructions to our terminal pumps has given us a tidy breakthrough.

A wholesale customer drives his tank truck into one of our terminals, puts his card in a machine, picks up the nozzle and fills his tank -- except that when he reaches his credit limit, the pump shuts off automatically. Interesting stuff, linking the physical equipment to our billing and credit monitoring system. Frankly, though, that's small beer compared to our one really big automated factory operation.

I am sure that you all are aware of our Prudhoe Bay field up on the North Slope of Alaska? That field contains rather more than 10% of all the crude oil pumped in the U.S. It is by far our largest revenue generating operation, with about 700,000 barrels of crude oil coming through our till every 24 hours. Even at today's depressed prices, we're talking about an enormous amount of money.

And the entire operation of that field is controlled by an automated, computerized system. The flow of oil from each of the 344 wells in that gigantic field is centrally controlled by operators at consoles. Moreover, the operating system is driven by an even more gigantic model of the field and its customers and inputs and outputs. A model complete with all the "what-if" capabilities.

Until I started preparing for this talk, I hadn't stopped to think of Prudhoe Bay as an automated factory. But it most certainly is one. And if I may say so, we believe our Standard Oil system at Prudhoe Bay is ahead of those of our colleagues and competitors. And this has compelling possibilities and enormous implications.

For instance, on a periodic basis, the various partners in Prudhoe Bay meet to hammer out a redetermination of each partner's share of the unitized field's production. The stakes are incredibly high -- hundreds of millions of dollars -- and so the system that simulates the scenarios and produces the negotiating tactics is of the highest value. We believe our model is superior, but we would, wouldn't we?

It seems obvious to me that what this system does today means inevitably that we will make it do more, faster, tomorrow. And not the least of my reasons is the fact that the system itself is a significant part of the total cost of the Prudhoe Bay field. One of the iron laws of competition tells companies that anything which might be done may have to be done. You can't afford to let your competitors do things without you. This characteristic may resemble the one which drives lemmings off cliffs, but there you are.

Let me tell you about another I.T. area of great interest. This is in three-dimensional seismic work, plugging in incredibly large amounts of data from seismic surveys and merging it with a second flood of information from well logging. The result, if you have a handy Cray computer, gives you unbelievable pictures of the strata beneath the earth's surface. These beautiful pictures represent, of course, abstractions, not reality. And danger lurks for those who forget that and think the oil is found before the well is drilled.

Sometime I'll tell you about our famous Mukluk well. The science was superb, the analysis was definitive -- and the hole was very dry.

Nevertheless, 3-D seismic systems can improve the petroleum explorer's batting average a great deal. We chart, for instance, the relationship between success in finding oil and investment in seismic work. It turns out the more work, the more success. But another interesting thing has happened. We've reached a new level of productivity. Now, because of more sophisticated 3-D seismic efforts, we get the same success from a drastically shortened seismic team input. This means cheaper exploration costs per barrel found during these times of low oil prices and tight budgets. And it foreshadows at least a chance of significantly more barrels being found when the cycle turns and prices and budgets rise.

Already, on an industrywide basis, the majors are spending far more on seismic work than the independents, drilling far fewer wells than the independents, and finding far more oil. The hallowed myth of our business -- the wildcatter -- is being turned on its head. The majors now find the most oil. And much of the credit must go to the latest seismic intelligence system, and with due immodesty which the class of '71 will recognize, we lead the pack in this field. This is crucial to our future because whilst BP's track record as explorers has been excellent, up to now, Standard Oil's has been, to put it kindly, mediocre.

Well, that's enough about what we're doing on the tactical level. What about the implications? Obviously, teleconferencing and other instant information transfer is likely to give me back a little more of my time I now spend flying hither and thither across the world. Nothing fancy about that implication. But just as the experts forecast, we are beginning to realize some structural and organizational changes because of <u>I.T.</u>

Our upstream petroleum operation in Houston has been radically rationalized. And while the <u>I.T.</u> revolution is only one of several causes for this reduction, it is certainly the prime cause and a tool to achieve a simplified structure and smaller, less expensive organization, with maybe half the hierarchical levels of a year ago. The fact that we are also reducing our total Standard Oil manpower by almost half compared with recent years was made possible in no small part by the new information systems.

It seems inevitable to me that this trend will continue. If my first line managers get more and more information; and if the purpose of information is that it be used; and if they are doing the using, rather than the middle managers between them and me, or my senior management; then how many messengers do I need in between?

So the classic assumption that the information revolution's real redundancies would come not only among the clerks, but strongly among the middle managers, seems to be coming true.

Doubtless, every company has its "Brigadier Belt" who will fight this trend. No one wants to become redundant. And because these Brigadiers have long experience of trench warfare, some who do not welcome retraining will devise interesting ways of throwing spanners in the works. But no matter. The trend will continue. Our organization is becoming more horizontal and less vertical with every passing day. So one possible implication of this trend to fewer vertical levels in organizations, and to more one-of-a-kind professionals, is that devotees of the conventional job evaluation techniques may need to consider other lines of work.

Another implication already coming true is that the products and services change as the ability to manipulate the transactional information grows. No sooner did we automate the gasoline pump and its bill generating role than the station itself began to change. And I think this may be my cue to shift my focus from tactics to strategy.

II. The Strategic Arena

The real change that the information revolution is bringing about at the filling station in my company is not in the hardware or real estate or architecture, but in the marketing decisions. Automated pumps and tellers brought first self-serve gasoline, and now, for us at least, a much more sophisticated look at our marketing strategies and market segmentation.

We're no different from other major companies in introducing car washes and convenience stores and other ways to get more kinds of purchases out of customers. But one way we may indeed be different is in compartmentalizing the market and deciding to create a specialized car care chain completely separate from the gas station now so transformed. And the car care market in the U.S. is about the same size as the gasoline market. We couldn't have contemplated the speed of service or the confidence of reliability as little as five years ago.

When it comes to proliferating products and services because of I.T.'s new capacity to manage complexity, another good case is our chain called Truckstops of America. Today's big truck stop is a complete, self-contained city, offering just about every known service (and some unmentionable ones, I'm sure). But it is a thriving business.

Perhaps the truck stop is a good example of the potential in real-world terms of what is going on in information manipulation and control. Conceptually, a truck stop used to be the farthest thing from the simplicity of a commodity business like oil. No longer. The complex inventories to track, the more people-intensive operations to manage, controlling the hectic face-to-face aspects of a retail service business -- all are being tamed by I.T.

This is a good place to bring up two points that fascinate me when we start thinking about the information revolution and oil company strategy. First, our record in the oil industry has been that with one or two honorable exceptions, we're indifferent strategists; since we don't seem able to extricate ourselves from the oil cycle of feast and famine. We have turned, for the most part, to becoming perfectly dreadful diversifiers. The oil industry has thrown immense treasure at all sorts of things, few if any of which have been successful. We seem to have a reverse Midas Touch. Outside the mainstream, most that we touch turns to write-downs.

I am too long in the planning game to believe that Artificial Intelligence will necessarily do more for us than Linear Programming did in the sixties. But actually, L.P. did a lot to educate the current generation of senior managers and A.I. will, I am confident, do the same for the next generation. In the meantime, we will stick to our lasts.

My second point is really a question: Just what is an oil company, anyway? Because of our gigantic capacity as a money machine, generating enormous cash flows, some of us are convinced that an oil company today at the top is really a giant financial institution -- at least in part a bank.

The globalization of finance is a direct result of the I.T. revolution. And the globalization of finance, plus all that happened after the demise of Bretton Woods, forced oil company treasurers to become much more sophisticated in their handling of foreign exchange and corporate finance. When I was British Petroleum's CFO, I recast the treasury function on lines that would be much more familiar to Wall Street than to Houston. Now BP's foreign exchange business puts it among the very largest financial institutions in the world.

Out of that need has already come the oil company's ability to do for themselves many things which were the domain of banks just ten years ago.

We now create instruments which turn raw materials into money and credit. Our own Standard Oil notes whose interest is indexed to the future price of oil are one example. Our latest effort, the Swiss Franc gold notes, are backed by the byproduct output of our copper mines. Creating this sort of instrument is a great intellectual challenge and of course involves mathematical modelling of a considerable order.

It seems also inevitable to me that oil company credit cards will turn into direct debit cards. And it follows that the business of raising money, manipulating cash and credit, and raising the efficiency of money flows is turning oil companies at the corporate level into financial institutions. So to me, a very important question is not whether oil companies will get into finance, but how much more deeply. And will we transform financial industries by our fresh non-bank outlook? Or will we simply replay our diversification mistakes of the seventies and eighties in the nineties? It's a relevant and open question.

This brings me to a final substantive question about the revolution, and one very personal note.

Let us assume that the I.T. revolution will indeed produce effective and more efficient tactical operating systems. Let us further assume that on the strategic level, artificial intelligence will augment radically -- for instance, improved Delphi approaches or with 6th and 7th generation computers. If we make those assumptions, and if we realize that in my industry, everyone will have those tools and use them...then it follows that we will all know more not only about the world, but also about each other's business and decisions. My question is whether in that universe, the revolution really matters?

Is it actually a zero-sum game? With all those tools, are we really better off? Or simply better educated?

But fortunately, we live in a stochastic world, not a deterministic one. Strategic Presbyterians are always surprised. It has now been 27 years since Harry Markowitz published his risk/return theory. And we still cannot calibrate risk effectively.

Maybe we'll get better. We will learn to make better judgments between a single $300 million Mukluk with a 2:1 probability of success -- and ten little Mukluks at $30 million apiece, each with a 10:1 success probability. But will we find more oil for less money? The question remains to be answered.

And now for a final, very personal observation on the implications of the information revolution. It has to do with speed and time and the aging process.

A generation ago, various thinkers were beginning to worry about what was termed the problem of leisure and what increasing leisure might do to people. Information either provides people more capacity to work, or it gives them more time for other things. By our nature, executives are driven, and so I suspect we will simply crank up the boiler and churn out more work. But what will we do if we indeed find ourselves with more leisurely evenings to ourselves for a change? I confess I would love it, but I haven't done a reality check with Sally, yet.

In the developed world, will we find ourselves burning out sooner because of the quickening pace? Will our laws defending aging workers against retirement have to be turned on their heads? And will our method of thinking as managers change as we find ourselves more and more in harness with artificially intelligent machines?

I don't know. No one does, yet. But we are certainly going to find out -- sooner, rather than later.